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KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

EXAMINER

ZERVIGON, RUDY

ART UNIT PAPER NUMBER

1763

DATE MAILED: 05/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/618,900

Applicant(s)

SHIMIZU ET AL.

Examiner

Rudy Zervigon

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) 12-21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 July 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 7/14/2003.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-12, drawn to a wafer processing apparatus, classified in class 118, subclass 723VE.
 - II. Claims 13-20, drawn to a method for forming a thin film, classified in class 427, subclass 587.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case, the apparatus as claimed can be used to practice another and materially different process, for example, and etching process.
3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.
4. Applicant is advised that the reply to this requirement to be complete must include an election of the invention to be examined even though the requirement be traversed (37 CFR 1.143).
5. During a telephone conversation with Katsushiro Arai on April 25th, 2005 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-11.

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Affirmation of this election must be made by applicant in replying to this Office action. Claims 12-21 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

6. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claim 5 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Applicant's "cooler" is not sufficiently described in the specification.

10. Claim 5 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural

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cooperative relationships are: The relationship between Applicant's "cooler" and other components

Drawings

11. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "cooler" and "hollow plate having an upper plate, a lower plate, and an interior therebetween" must be shown or the features canceled from the claims. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 1- are rejected under 35 U.S.C. 103(a) as being unpatentable over Hayakawa et al (USPat. 5,447,568) in view of Lee; Hideki (US 5,785,796 A). Hayakawa teaches a single-wafer (3005; Figure 10; column 11, lines 41-66)-processing type CVD apparatus (Figure 10, 11; column 11, line 41 - column 12, line 38) for forming a thin film on an object (3005; Figure 10; column 11, lines 41-66) to be processed, which comprises: a reaction chamber (3006; Figure 10; column 11, lines 41-66), a susceptor (3004; Figure 10; column 11, lines 41-66) for placing said object (3005; Figure 10; column 11, lines 41-66) thereon, which is provided inside said reaction chamber (3006; Figure 10; column 11, lines 41-66); a shower plate (3502; Figure 14; column 14, lines 1-47) for emitting a jet of reaction gas (3101; Figure 10; column 11, lines 41-66) to said object (3005; Figure 10; column 11, lines 41-66), which is disposed parallel and opposing to said susceptor (3004; Figure 10; column 11, lines 41-66); an orifice (3601; Figure 10; column 11, lines 41-66) for bringing a liquid raw material (3101; Figure 10; column 11, lines 41-66) for deposition and a carrier gas (3002; Figure 10; column 11, lines 41-66) into said reaction chamber (3006; Figure 10; column 11, lines 41-66), which is formed through a ceiling (Figure 14; column 14, lines 1-47) of said reaction chamber (3006; Figure 10; column 11, lines 41-66); an evaporation plate (3306, Figure 11,14; column12, lines 3-59; column 14, lines 1-47) for vaporizing said liquid raw material (3101; Figure 10; column 11, lines 41-66), which is disposed

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in a space between said ceiling (Figure 14; column 14, lines 1-47) of said reaction chamber (3006; Figure 10; column 11, lines 41-66) and said shower plate (3502; Figure 14; column 14, lines 1-47); and a temperature controller (4000; Figure 10; column 11, lines 41-66) for said evaporation plate (3306, Figure 11,14; column12, lines 3-59; column 14, lines 1-47) at respective given temperatures (column 13, lines 35-45) – claim 1

Hayakawa further teaches:

- i. The apparatus (Figure 10, 11; column 11, line 41 - column 12, line 38) as claimed in claim 1, wherein the given temperature of said evaporation plate (3306, Figure 11,14; column12, lines 3-59; column 14, lines 1-47) is within the range of 40°C. to 300°C (column 13, lines 35-45), as claimed by claim 3
- ii. The apparatus (Figure 10, 11; column 11, line 41 - column 12, line 38) as claimed in claim 1, wherein said temperature controller (4000; Figure 10; column 11, lines 41-66) comprises one or more heaters (3307, 4002; Figure 11) which are arranged adjacently to said evaporation plate (3306, Figure 11,14; column12, lines 3-59; column 14, lines 1-47) and to said shower plate (3502; Figure 14; column 14, lines 1-47), temperature detectors (4001; Figure 11) which are respectively linked to said evaporation plate (3306, Figure 11,14; column12, lines 3-59; column 14, lines 1-47), a temperature regulator (4000; Figure 10) which is linked to said heater (3307, 4002; Figure 11), and said temperature detectors (4001; Figure 11) – claim 5
- iii. The apparatus (Figure 10, 11; column 11, line 41 - column 12, line 38) as claimed in claim 1, wherein said liquid raw material (3101; Figure 10; column 11, lines 41-66) is a solution wherein a metal complex raw material or a solid raw material used for deposition

is dissolved in a solvent, as claimed by claim 6 – Applicant's designation of the raw material gas in a recitation of intended use of the claimed apparatus claims. It is well established that apparatus claims must be structurally distinguished from the prior art (In re Danley, 120 USPQ 528, 531 (CCPA 1959). "Apparatus claims cover what a device is, not what a device does ." (emphasis in original) Hewlett - Packard Co . v. Bausch & Lomb Inc ., 15 USPQ2d 1525, 1528 (Fed. Cir. 1990), MPEP – 2114). Further, a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Exparte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

- iv. The apparatus (Figure 10, 11; column 11, line 41 - column 12, line 38) as claimed in claim 1, wherein said carrier gas (3002; Figure 10; column 11, lines 41-66) is an inert gas (column 7; lines 1-3), as claimed by claim 7
- v. The apparatus (Figure 10, 11; column 11, line 41 - column 12, line 38) as claimed in claim 1, wherein the evaporation plate (3306, Figure 11, 14; column 12, lines 3-59; column 14, lines 1-47) is a hollow plate having an upper plate (Figure 14; top portion 3306), a lower plate (Figure 14; lower portion 3306), and an interior therebetween, said upper plate (Figure 14; top portion 3306) and said lower plate (Figure 14; lower portion 3306) having pores (Figure 14; holes in each of 3306, not labelled) wherein the liquid raw material (3101; Figure 10; column 11, lines 41-66) flows through the pores (Figure 14; holes in each of 3306, not labelled) of the upper plate (Figure 14; top portion 3306), the interior, and the pores (Figure 14; holes in each of 3306, not labelled) of the lower

plate (Figure 14; lower portion 3306) toward the shower plate (3502; Figure 14; column 14, lines 1-47), as claimed by claim 9

- vi. The apparatus (Figure 10, 11; column 11, line 41 - column 12, line 38) as claimed in claim 9, wherein the pores (Figure 14; holes in each of 3306, not labelled) of the upper plate (Figure 14; top portion 3306) are arranged in the vicinity of the periphery of the upper plate (Figure 14; top portion 3306), as claimed by claim 11

Hayakawa does not teach:

- i. and a temperature controller (4000; Figure 10; column 11, lines 41-66) for controlling said shower plate (3502; Figure 14; column 14, lines 1-47) – claim 1
- ii. The apparatus (Figure 10, 11; column 11, line 41 - column 12, line 38) as claimed in claim 1, wherein a base area of said evaporation plate (3306, Figure 11,14; column12, lines 3-59; column 14, lines 1-47) is within the range of 80% to 120% of a base area of said space, as claimed by claim 2
- iii. The apparatus (Figure 10, 11; column 11, line 41 - column 12, line 38) as claimed in claim 3, wherein the given temperature of said shower plate (3502; Figure 14; column 14, lines 1-47) is in the range of 0-50°C higher than the temperature of said evaporation plate (3306, Figure 11,14; column12, lines 3-59; column 14, lines 1-47), as claimed by claim 4
- iv. one or more cooler which are arranged adjacently to said evaporation plate (3306, Figure 11,14; column12, lines 3-59; column 14, lines 1-47) and to said shower plate (3502; Figure 14; column 14, lines 1-47), temperature detectors which are respectively linked to said evaporation plate (3306, Figure 11,14; column12, lines 3-59; column 14, lines 1-47) and to said shower plate (3502; Figure 14; column 14, lines 1-47), a temperature

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regulator which is linked to said heater, said cooler and said temperature detectors – claim 5

- v. The apparatus (Figure 10, 11; column 11, line 41 - column 12, line 38) as claimed in claim 1, which further comprises a pressure detector for detecting a pressure in a space between the ceiling (Figure 14; column 14, lines 1-47) of said reaction chamber (3006; Figure 10; column 11, lines 41-66) and said evaporation plate (3306, Figure 11,14; column 12, lines 3-59; column 14, lines 1-47), and a pressure detector for detecting a pressure in a space between said shower plate (3502; Figure 14; column 14, lines 1-47) and said susceptor (3004; Figure 10; column 11, lines 41-66), as claimed by claim 8

Lee teaches:

- vi. and a temperature controller (120; Figure 10; column 29, lines 12-24) for controlling Lee's shower plate (122; Figure 10; column 29, lines 12-24) – claim 1
- vii. one or more "cooler" (123; Figure 10; column 29, lines 12-24) which are arranged adjacently to Lee's shower plate (122; Figure 10; column 29, lines 12-24), a temperature regulator (120; Figure 10; column 29, lines 12-24) which is linked to Lee's heater (124; Figure 10), Lee's cooler (123; Figure 10; column 29, lines 12-24) – claim 5

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Lee's temperature control apparatus (123, 124, 120; Figure 11) to Hayakawa's showerhead plate (3502; Figure 14), including optimizing the dimension and relative process temperature of Hayakawa's evaporation plate (3306, Figure 11,14; column 12, lines 3-59; column 14, lines 1-47).

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Motivation to add Lee's temperature control apparatus (123, 124, 120; Figure 11) to Hayakawa's showerhead plate (3502; Figure 14), including optimizing the dimension and relative process temperature of Hayakawa's evaporation plate (3306, Figure 11, 14; column 12, lines 3-59; column 14, lines 1-47) is for preventing process gas from depositing upstream of the process chamber as taught by Hayakawa (column 15; lines 42-48) and Lee (column 22; lines 50-65). It is well established that changes in apparatus dimensions are within the level of ordinary skill in the art. (*Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); See MPEP 2144.04). It would be obvious to those of ordinary skill in the art to optimize the operation of the claimed invention (*In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); *Merck & Co. Inc. v. Biocraft Laboratories Inc.*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989); *In re Kulling*, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990), MPEP 2144.05).

14. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hayakawa et al (USPat. 5,447,568) and Lee; Hideki (US 5,785,796 A) in view of Strang, Eric J. (US 20040129217 A1). Hayakawa and Lee do not teach pressure detectors.

Strang teaches a pressure detector (220; Figure 7A,B) in his process gas delivery assembly (210) for measuring the pressure in process gas plenum 216.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add plural of Strang's pressure detector (220; Figure 7A,B) to Hayakawa's and Lee's corresponding gas delivery plenums.

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Motivation to add plural of Strang's pressure detector (220; Figure 7A,B) to Hayakawa's and Lee's corresponding gas delivery plenums is for detecting a pressure change in the process gas delivery and controlling the gas delivery in response thereof as taught by Strang (abstract).

15. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hayakawa et al (USPat. 5,447,568) and Lee; Hideki (US 5,785,796 A) in view of Ku, Vincent W. et al. (US 20030019428 A1). Hayakawa and Lee do not teach Hayakawa's upper plate (Figure 14; top portion 3306) of Hayakawa's evaporation plate (3306, Figure 11,14; column12, lines 3-59; column 14, lines 1-47) is a conical or convex surface on which Hayakawa's liquid raw material (3101; Figure 10; column 11, lines 41-66) flows from Hayakawa's center to Hayakawa's periphery of Hayakawa's upper plate (Figure 14; top portion 3306).

Ku teaches an upper plate (34; Figure 1) with conical surfaces (60, 62, 71; Figure 1).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to shape Hayakawa's evaporation plate (3306, Figure 11,14; column12, lines 3-59; column 14, lines 1-47) in a conical form as taught by Ku.

Motivation to shape Hayakawa's evaporation plate (3306, Figure 11,14; column12, lines 3-59; column 14, lines 1-47) in a conical form as taught by Ku is for providing uniform process gas dispersion as taught by Ku ([0046]).

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

US 6444039 B1

US 6391147 B2

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US 6004885 A

US 5970382 A

US 5954887 A

US 5900103 A

US 5772770 A

US 5670218 A

US 5647945 A

US 5616208 A

US 4931135 A

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272.1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1763 art unit is (703) 872-9306. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.

Rudy Zervigon
5/2/5